

DTL9294752
CAGE Code: 19200
___ July 2006

DETAIL SPECIFICATION

FOR THE

CARTRIDGE, IGNITION, M752A1
FOR M853A1/816/819 CARTRIDGES FOR THE 81MM MORTAR

U.S. Army RDECOM-ARDEC
Picatinny Arsenal, NJ 07806-5000

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Mortar Munitions – AMSRD-AAR-QEM-C

This specification was approved as being in compliance with the criteria of MIL-STD-961D by the RDECOM - ARDEC QE&SA Detail Specification Review Panel on █ July 2006. Copies of the approval memorandum and signatures of authorized authorities are on the file and available upon request from the Preparing Activity.

FSC 1315

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This cover page must not be deleted from the solicitation copy.

1. SCOPE

1.1 Scope. This product description covers the requirements, examinations and tests for the parts and Loading, Assembling and Packing (LAP) of M752A1 Ignition Cartridges for the 81mm M853A1/816/819 Cartridges for the 81mm Mortar.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are needed to meet the requirements specified in sections 3, 4, and 5 of this detail specification. This section does not include documents in other sections of this detail specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all requirements, documents cited in sections 3, 4, and 5 of this detail specification, whether or not they are listed.

2.2 Government Documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-1168 - Ammunition Lot Numbering and Ammunition Data Card
MIL-STD-1916 - DOD Preferred methods for Acceptance of Product

(Unless otherwise indicated copies of this above specifications, standards and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS (See 6.4)

U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING
CENTER (ARDEC)

PRODUCT AND PACKAGING DRAWINGS

- 9294752 - Cartridge, Ignition, M752A1
- 13000797 - Plug, Firing
- 13000746 - O-ring

(Copies of other Government documents, drawings and publications required by contractors in connection with specific acquisition functions should be obtained from the U.S. Army RDECOM-ARDEC, AMSRD-AAR-QEM-C, Picatinny, NJ 07806-5000.

PUBLICATIONS

CODE OF FEDERAL REGULATIONS

- 49 CFR - Interstate Commerce Commission Rules and Regulation for the Transportation of Explosives and other Dangerous Articles

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Orders for the above publication should cite 49 CFR (latest revision)).

2.2.3 Reference Documents. The following document is not mandatory but for reference only.

SPECIFICATION

DEPARTMENT OF DEFENSE

- MIL-P-223 - Powder, Black

2.3 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents, which are DOD adopted, are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (See 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS

- B117 - Standard Test Method of Salt Spray (Fog) Testing

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, except references to higher level program unique specifications for this program, the text of this document takes precedence. Nothing in this document, however,

supersedes applicable laws and regulations unless a specific exemption has been obtained. (See contract provisions for additional precedence criteria).

3. REQUIREMENTS

3.1 Materials. Materials, parts and assemblies shall comply with requirements specified on the applicable drawings and referenced specifications.

3.2 Components and assemblies. The ignition cartridge assembly and components shall comply with all requirements specified on drawing 9294752 and with all requirements specified in applicable specifications, associated drawings and standards.

3.2.1 Corrosion resistance (salt spray). Parts selected for the salt spray test shall show no evidence of pitting or mottling when tested in accordance with 4.5.9.

3.3 Moisture content of black powder. The moisture content of the black powder pellets used in loading the ignition cartridge, at the time of loading, shall not exceed 0.50 percent. Testing shall be as specified in 4.5.1.

3.4 Fed 150 primer testing.

3.4.1 Nonfunctioning. The primer shall not function under an applied energy value of 8.85 inch ounces minimum (min.) using a 2.95 pound ball when tested as specified in 4.5.2.1.

3.4.2 Sensitivity. The primer when tested as specified in 4.5.2.2 will be accepted if the following requirement is satisfied:

$$\frac{2.77 - \text{Mean}}{\sqrt{0.16 + SD^2}} \geq 3.23$$

Where

Mean = Mean Velocity calculated in 4.5.2.2.

SD = Standard Deviation calculated in 4.5.2.2.

3.4.3 Safety drop test. The primer shall not function as a result of the 1.5 meter (m) cartridge drop specified in 4.5.2.3.

3.5 Leak tests. Each body assembly, after the primer is loaded and the lacquer cured, and each loaded ignition cartridge, shall satisfactorily pass the leak tests specified in 4.5.3.

3.6 Velocity, functioning and security (proving ground test). The ignition cartridges shall comply with the following requirements when tested as specified in 4.5.5. The rounds shall be fired from a M252 81mm mortar at an elevation of 800 mils.

3.6.1 Misfires. The ignition cartridges shall function on the first attempt, without any audible hang fire.

3.6.2 Velocity and functioning (proving ground). The cartridge assemblies shall function and shall impart a corrected mean muzzle velocity as specified in Table I. In addition, the velocity standard deviation of the lot shall be not greater than 0.9 mps (3.1 fps).

Table I: Mean velocity Requirements

| Cartridge | Cartridge Weight | Velocity (max) (Para 3.6.2) | Velocity (min) (Para 3.6.2) | Uniformity Velocity (Para 3.7) |
|-------------|------------------|--------------------------------|--------------------------------|-----------------------------------|
| M819 | 10.35 ± 0.02 lbs | 61.0 mps (200 fps) | 54.9 mps (180 fps) | 57.9 mps (190 fps) |
| M853A1/M816 | 8.9 ± 0.02 lbs | 67.0 mps (220 fps) | 61.0 mps (200 fps) | 64.0 mps (210 fps) |

3.6.3 Metal part security. There shall be no evidence of rupture or metal parts separation in the gun bore or in flight.

- 3.7 Propellant charge uniformity. The M9 propellant lots shall achieve a velocity as specified in Table I (see 4.5.6). This test shall be required when a lapse of two years or more occurs between propellant acceptance and LAP initiation.
- 3.8 Static pressure. The average internal ignition cartridge pressure plus 3 standard deviations shall not exceed 23,000 psi when tested as specified in 4.5.7.
- 3.9 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection in accordance with the technical provisions herein. (See 4.3 and 6.2)
- 3.10 Bursting strength. The tube assemblies shall not burst at a compression load of 57 pounds, minimum, but shall burst at a compression load of 192 pounds, maximum. Testing shall be as specified in 4.5.8.
- 3.11 Check test for deterioration of ignition cartridge. If the total elapsed time between original acceptance of the ignition cartridge lot and assembly of that lot into the complete round exceeds two years, or if the ignition cartridges were subjected to adverse conditions for any period of time since previous tests, the ignition cartridges shall be subjected to, and must satisfactorily comply with the test in 4.5.10 before the ignition cartridges are assembled into the complete rounds.
- 3.12 Workmanship. All parts and assemblies shall be fabricated and loaded in a thorough workmanlike manner. They shall be free of burrs, sharp edges, cracks, dirt, rust and other foreign matter. The cleaning method used shall not be injurious to any part nor shall parts be contaminated by the cleaning agent. All required markings should be neat and sharply defined.

4. VERIFICATION

TABLE II: Requirements/verification cross reference matrix

| METHOD OF VERIFICATION | | | | | CLASSES OF VERIFICATION | | | |
|--|--|---------------------|---|---|------------------------------------|--------------------|---|------------------------|
| 1-Analysis 2-Demonstration 3-Examination 4-Test | | | | | A- First Article B- Conformance | | | |
| Section Requirement | Description | Verification Method | | | | Verification Class | | Section 4 Verification |
| | | 1 | 2 | 3 | 4 | A | B | |
| 3.1 | Materials | | | X | | X | X | 4.4 |
| 3.2 | Components & assemblies | | | X | X | X | X | 4.5.2 |
| 3.2.1 | Corrosion resistance (salt spray) | X | | | X | X | X | 4.5.9 |
| 3.3 | Moisture content of black powder | X | | | X | X | X | 4.5.1 |
| 3.4 | Fed 150 primer testing | | | X | X | X | X | 4.5.2 |
| 3.4.1 | Nonfunctioning | | | X | X | X | X | 4.5.2.1 |
| 3.4.2 | Sensitivity | | | X | X | X | X | 4.5.2.2 |
| 3.4.3 | Safety drop test | | | X | X | X | X | 4.5.2.3 |
| 3.5 | Leak tests | | | X | X | X | X | 4.5.3 |
| 3.6 | Velocity, functioning and security (proving ground test) | | | X | X | X | X | 4.5.5 |
| 3.6.1 | Misfire | | | X | X | X | X | 4.5.5 |
| 3.6.2 | Velocity and functioning (proving ground) | | | X | X | X | X | 4.5.5 |
| 3.6.3 | Metal part security | | | X | X | X | X | 4.5.5 |
| 3.7 | Propellant charge uniformity | | | | | | | 4.5.6 |
| 3.8 | Static pressure | | X | X | X | X | X | 4.5.7 |
| 3.9 | First article | | X | X | X | X | | 4.3 |
| 3.10 | Bursting strength | | X | X | X | X | X | 4.5.8 |
| 3.11 | Check test for deterioration of ignition cartridge | | | X | X | | X | 4.5.10/4.5.10.1 |
| 3.12 | Workmanship | | | X | X | X | X | 4.4.2.1-4.4.2.14 |

- 4.1 Classification of verification. The verification requirements specified herein are classified as follows:
- a. First article inspection (see 4.3).
 - b. Conformance inspection (see 4.4).
- 4.2 Verification conditions. Unless otherwise specified all inspections shall be performed in accordance with the test conditions specified in section 4 of this specification.
- 4.3 First article.
- 4.3.1 First article quantity. When specified in the contract, a sample shall be subjected to first article verification in accordance with Table III.
- 4.3.2 Verification to be performed. The first article verification shall be performed in accordance with Table II.

TABLE III. First Article Inspection
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH | TITLE | SHEET 1 of 3 | | DRAWING NUMBER See below |
|--|--|----------------------|-----------------------|-----------------------------|
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| 8 | <u>Pellet (Dwg. 7549177)</u> Examination for Defects | 25 | 3.2 | 4.4.2.1 |
| | Moisture Content | 10 | 3.3 | 4.5.1 |
| | <u>O-ring (Dwg. 13000746)</u> Examination for defects | 25 | 3.2 | 4.4.2.2 |
| | <u>Plug, firing (Dwg. 13000797)</u> Examination for defects | 25 | 3.2 | 4.4.2.3 |
| | <u>Head (Dwg. 9293427)</u> Examination for defects | 25 | 3.2 | 4.4.2.4 |
| | <u>Head Assembly (Head + O-ring) (Dwg. 13012620)</u> Examination of defects | 25 | 3.2 | 4.4.2.4a |
| | <u>Tube (Dwg. 9294754)</u> Examination for defects | 25 | 3.2 | 4.4.2.5 |
| | Burst strength | 25 1/ | 3.9 | 4.5.8 |
| | <u>Body (Dwg. 9294755)</u> Examination for defects | 25 | 3.2 | 4.4.2.6 |
| | Salt spray test | 25 | 3.2.1 | 4.5.9 |
| | <u>Cap (Dwg. 9294756)</u> Examination for defects | 25 | 3.2 | 4.4.2.7 |
| NOTES: 1/ The same samples submitted for examination shall be used for the burst test. | | | | |

TABLE III. First Article Inspection
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH | TITLE | SHEET 2 of 3 | | DRAWING NUMBER See below |
|----------------|--|----------------------|-----------------------|-----------------------------|
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| | <u>Tube, flash (Dwg. 9294758)</u> | | | |
| | Examination for defects | 25 | 3.2 | 4.4.2.8 |
| | Salt Spray Test | 25 | 3.2.1 | 4.5.9 |
| | <u>Flash Tube Assembly (Dwg. 9294757)</u> | | | |
| | Examination for defects | 25 | 3.2 | 4.4.2.8 |
| | <u>Tube Assembly (Dwg. 9294753)</u> | | | |
| | Examination for defects | 25 | 3.2 | 4.4.2.10 |
| | <u>Body Assembly (Dwg. 12630551)</u> | | | |
| | Examination for defects | 25 | 3.2 | 4.4.2.11 |
| | <u>Cartridge, Ignition Prior to Filling with Propellant (Dwg. 9294752)</u> | | | |
| | Examination for defects | 25 | 3.2 | 4.4.2.12 |
| | Sensitivity non-functioning | 200 | 3.4.1 | 4.4.3.3.1/4.5.2.1 |
| | Sensitivity functioning | 500 | 3.4.2 | 4.4.3.3.2/4.5.2.2 |
| | Safety Drop Test | 25 | 3.4.3 | 4.4.3.3.3/4.5.2.3 |
| | <u>Cartridge, Ignition, Prior to Assembly of Cap (Dwg. 9294752)</u> | | | |
| | Examination of Defects | 25 | 3.2 | 4.4.2.13 |
| NOTES: | | | | |

TABLE III. First Article Inspection
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH | TITLE | SHEET 3 of 3 | | DRAWING NUMBER See below |
|---|---|-------------------------|--------------------------|---|
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| | <u>Cartridge, Ignition, After Assembly of Cap (Dwg. 9294752)</u> Examination for Defects Leak Test Static pressure Test Proving Ground Test | 25 50 25 3/ 50 | 3.2 3.5 3.8 3.6 | 4.4.2.14 4.5.3 4.4.3.6/4.5.7 4.5.5 |
| NOTES: 3/ This test is required for each new M9 propellant lot. | | | | |

4.3.2 First article rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate inspection upon any failure of an assembly, component or test specimen to comply with any of the requirements. The first article ballistic test shall be rejected if:

- a. The mean velocity fails to comply with the requirement.
- b. The velocity standard deviation exceeds the requirement.
- c. One or more misfires attributable to the ignition cartridge occur.
- d. One or more metal part separations attributable to the ignition cartridge occur.

4.4 Conformance inspection.

4.4.1 Inspection lot formation. The term "inspection lot" is defined as a homogeneous collection of units of product from which a representative sample is drawn or which is inspected 100 percent to determine conformance with applicable requirements. Units of product selected for inspection shall represent only the inspection lot from which they are drawn and shall not be construed to represent any prior or subsequent quantities presented for inspection. Homogeneity shall be considered to exist provided the inspection lot has been produced by one manufacturer, in one unchanged process, using the same materials and methods, in accordance with the same drawings, same drawing revisions, same specifications and same specification revisions. All material submitted for inspection in accordance with this specification shall comply with the homogeneity criteria specified herein, regardless of the type of inspection procedure, which is being applied to determine conformance with requirements. In addition, each inspection lot of ignition cartridges shall contain:

- a. Metal parts from one lot interfix from one manufacturer.
- b. Black powder pellets from one lot interfix from one manufacturer.
- c. M9 propellant from not more than one lot.
- d. Fed 150 primers from not more than one lot.

4.4.2 Examinations and tests.

- a. Classification of characteristics. Conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified.
- b. The acceptance criteria for sampling inspection shall be in accordance with the levels provided in the conformance examination/test paragraph and MIL-STD-1916.

- c. Alternative conformance acceptance. Unless otherwise specified herein or provided for in the contract, alternate conformance procedures may be proposed by the contractor (See paragraph 4.1) of MIL-STD-1916.

For the classification of characteristics, the following definitions apply:

Critical Level I - A critical level I defect is a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or relying on the product, or a defect that judgment and experience indicate is likely to prevent performance of the tactical function of a major end item such as a tank, land vehicle, missile, aircraft, artillery, or other major weapon system

Critical Level II - A critical level II defect is a defect, other than critical level I, that judgment and experience indicate may, depending upon the degree of variance from the design requirement:

- a. Result in hazardous or unsafe conditions for individuals using, maintaining, or relying upon the product; or
- b. Prevent performance of the tactical function of a major end item.

Major - A major defect is a defect, other than critical, that is likely to result in failure, or that will materially reduce the usability of the product for its intended purpose.

Minor - A minor defect is a defect that is not likely to materially reduce the usability of the product for its intended purpose, or a defect that is a departure from established standards having little bearing on the effective use or operation of the unit.

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.1 | TITLE Pellet | SHEET 1 OF 1 | | DRAWING NUMBER 7549177 |
|--|------------------------------|-------------------------|--------------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Weight of pellet | VL-IV | 3.2 | Balance |
| 102 | Moisture content | 25 1/ | 3.3 | 4.5.1 |
| 103 | Outside diameter | VL-IV | 3.2 | Gage |
| 104 | Inside diameter | VL-IV | 3.2 | Gage |
| 105 | Length | VL-IV | 3.2 | Gage |
| <u>Minor</u> | | | | |
| 201 | Pellet chipped or cracked | VL-III | 3.1 | Visual |
| 202 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: 1/ Twenty-five (25) randomly selected pellets from each production shift. | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.2 | TITLE O-ring | SHEET 1 OF 1 | | DRAWING NUMBER 13000746 |
|---|--------------------------------|-------------------------|--------------------------|---|
| | | | | NEXT HIGHER ASSEMBLY 9294752/9391019 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Inner Diameter | VL-IV | 3.2 | Gage |
| 102 | Cross-sectional diameter | VL-IV | 3.2 | Gage |
| 103 | Composition | /1 | 3.2 | *Gage/Manual |
| 104 | Presence of flash, cracks, etc | VL-IV | 3.2 | Visual |
| <u>Minor</u> | | | | |
| 201 | Evidence of poor workmanship | VL-III | 3.2 | Visual |
| NOTES: 1. The supplier (s) shall provide the material certification with each delivered lot. | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.3 | TITLE Plug, Firing | SHEET 1 OF 1 | | DRAWING NUMBER 13000797 |
|----------------------|---|-------------------------|--------------------------|---|
| | | | | NEXT HIGHER ASSEMBLY 9294752/9391019 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Length of tip to second largest diameter | VL-IV | 3.2 | Gage |
| 102 | Total length including tip | VL-IV | 3.2 | Gage |
| 103 | Length from tip to small diameter | VL-IV | 3.2 | Gage |
| 104 | Radius improper | VL-IV | 3.2 | Gage |
| 105 | Large diameter | VL-IV | 3.2 | Gage |
| 106 | Small diameter | VL-IV | 3.2 | Gage |
| 107 | Protective finish missing | VL-IV | 3.2 | Visual |
| 108 | Chamfer missing or incorrect | VL-IV | 3.2 | Visual |
| 109 | True position of tip with large outside diameter | VL-IV | 3.2 | Gage |
| 110 | Shoulder length from the second largest diameter to o-ring diameter | VL-IV | 3.2 | Gage |
| 111 | Width of groove for o-ring | VL-IV | 3.2 | Gage |
| 112 | Diameter of o-ring groove (smallest diameter) | VL-IV | 3.2 | Gage |
| <u>Minor</u> | | | | |
| 201 | Surface finish improper | VL-III | 3.2 | Visual |
| 202 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| | | | | |
|----------------------|---|-------------------------|--------------------------|---------------------------------|
| PARAGRAPH 4.4.2.4 | TITLE Head | SHEET 1 OF 2 | | DRAWING NUMBER 9293427 |
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Pitch diameter of internal threads | VL-IV | 3.2 | Gage |
| 102 | Minor diameter of internal threads | VL-IV | 3.2 | Gage |
| 103 | Pitch diameter of external threads | VL-IV | 3.2 | Gage |
| 104 | Major diameter of external threads | VL-IV | 3.2 | Gage |
| 105 | Length of internal thread, min. | VL-IV | 3.2 | Gage |
| 106 | Overall length | VL-IV | 3.2 | Gage |
| 107 | Length of large internal diameter | VL-IV | 3.2 | Gage |
| 108 | Diameter of firing plug hole | VL-IV | 3.2 | Gage |
| 109 | Large outside diameter | VL-IV | 3.2 | Gage |
| 110 | Small outside diameter | VL-IV | 3.2 | Gage |
| 111 | Large inside diameter | VL-IV | 3.2 | Gage |
| 112 | True position of large inside diameter with P.D. of external thread | VL-IV | 3.2 | Gage |
| 113 | True position of firing plug hole with P.D. of external thread | VL-IV | 3.2 | Gage |
| 114 | True position of internal threads with external threads | VL-IV | 3.2 | Gage |
| 115 | Length from shoulder to end of external threads | VL-IV | 3.2 | Gage |
| 116 | Protective finish missing | VL-IV | 3.2 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.4 | TITLE Head (cont'd) | SHEET 2 OF 2 | | DRAWING NUMBER 9293427 |
|----------------------|--------------------------------------|-------------------------|--------------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Minor</u> | | | | |
| 201 | Surface finish improper | VL-III | 3.2 | Visual |
| 202 | Diameter of spanner holes | VL-III | 3.2 | Gage |
| 203 | Depth of spanner holes | VL-III | 3.2 | Gage |
| 204 | Location of spanner holes | VL-III | 3.2 | Gage |
| 205 | Distance from front face to shoulder | VL-III | 3.2 | Gage |
| 206 | Length of thread undercut | VL-III | 3.2 | Gage |
| 207 | Chamfer missing or incorrect | VL-III | 3.2 | Visual |
| 208 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| | | | | |
|--|-------------------------------------|-------------------------|--------------------------|---|
| PARAGRAPH 4.4.2.4a | TITLE Head Assembly (Head + o-ring) | SHEET 1 OF 1 | | DRAWING NUMBER 13012620 |
| | | | | NEXT HIGHER ASSEMBLY 9294752/9391019 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | O-ring missing or not fully seated | VL-IV | 3.2 | Manual/Visual |
| 102 | O-ring not lubricated | VL-IV | 3.2 | Visual |
| 103 | Firing plug not fully seated | \1 | 3.2 | Manual/Visual |
| <u>Minor</u> | | | | |
| 201 | Evidence of Poor workmanship | VL-III | 3.12 | Visual |
| NOTES: 1. Firing plug with o-ring must be seated flush to the head with o-ring properly seated in the groove after assembly | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.5 | TITLE Tube | SHEET 1 OF 1 | | DRAWING NUMBER 9294754 |
|----------------------|------------------------------|-------------------------|--------------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294753 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Thickness | VL-IV | 3.2 | Gage |
| 102 | Length | VL-IV | 3.2 | Gage |
| 103 | Inside diameter | VL-IV | 3.2 | Gage |
| 104 | Tube not spiral wound | 5 | 3.2 | Visual |
| 105 | Burst strength | 25 | 3.9 | Gage/4.5.8 |
| <u>Minor</u> | | | | |
| 201 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.6 | TITLE Body | SHEET 1 OF 2 | | DRAWING NUMBER 9294755 |
|----------------------|--|-------------------------|--------------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | | | | |
| A | Flash hole missing or obstructed | 100% | 3.2 | Visual |
| <u>Major</u> | | | | |
| 101 | Pitch diameter of threads, min. | VL-IV | 3.2 | Gage |
| 102 | Major diameter of threads, min. | VL-IV | 3.2 | Gage |
| 103 | Diameter of primer cavity | VL-IV | 3.2 | Gage |
| 104 | Depth of primer cavity | VL-IV | 3.2 | Gage |
| 105 | Depth of flash tube cavity | VL-IV | 3.2 | Gage |
| 106 | Diameter of flash tube cavity | VL-IV | 3.2 | Gage |
| 107 | Diameter of flash hole rear of pellet cavity | VL-IV | 3.2 | Gage |
| 108 | Large outside diameter | VL-IV | 3.2 | Gage |
| 109 | Diameter of pellet cavity | VL-IV | 3.2 | Gage |
| 110 | Depth to bottom of pellet cavity | VL-IV | 3.2 | Gage |
| 111 | Length overall | VL-IV | 3.2 | Gage |
| 112 | True position of primer cavity | VL-IV | 3.2 | Gage |
| 113 | Width of groove | VL-IV | 3.2 | Gage |
| 114 | Depth of groove | VL-IV | 3.2 | Gage |
| 115 | Small outside diameter | VL-IV | 3.2 | Gage |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.6 | TITLE Body (cont'd) | SHEET 2 OF 2 | | DRAWING NUMBER 9294755 |
|----------------------|---|-------------------------|--------------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| 116 | Diameter of countersink at base of primer cavity, max. | VL-IV | 3.2 | Gage |
| 117 | Length from rear face to large outside diameter | VL-IV | 3.2 | Gage |
| 118 | Outside diameter forward and rear of groove | VL-IV | 3.2 | Gage |
| 119 | Length from large diameter to end of external thread | VL-IV | 3.2 | Gage |
| 120 | Length from large diameter to beginning of thread | VL-IV | 3.2 | Gage |
| 121 | Diameter of thread undercut | VL-IV | 3.2 | Gage |
| 122 | Length of large diameter section | VL-IV | 3.2 | Gage |
| 123 | Length from front face to groove | VL-IV | 3.2 | Gage |
| 124 | Protective finish missing or inadequate | VL-IV | 3.2 | Visual |
| 125 | True position of forward outside diameter with P.D. of thread | VL-IV | 3.2 | Gage |
| 126 | Salt spray test | 25 | 3.2.1 | Visual/4.5.9 |
| 127 | Inside chamfer at entrance of primer cavity incorrect | VL-IV | 3.2 | Gage |
| <u>Minor</u> | | | | |
| 201 | Radii or chamfers missing or incorrect | VL-III | 3.2 | Visual |
| 202 | Surface finish improper | VL-III | 3.2 | Visual |
| 203 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| | | | | |
|----------------------|--|-------------------------|--------------------------|---------------------------------|
| PARAGRAPH 4.4.2.7 | TITLE Cap | SHEET 1 OF 1 | | DRAWING NUMBER 9294756 |
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Forward outside diameter (OD) | VL-IV | 3.2 | Gage |
| 102 | Total length | VL-IV | 3.2 | Gage |
| 103 | Rear OD | VL-IV | 3.2 | Gage |
| 104 | Distance from rear face to shoulder | VL-IV | 3.2 | Gage |
| 105 | Diameter of cavity | VL-IV | 3.2 | Gage |
| 106 | Depth of cavity | VL-IV | 3.2 | Gage |
| 107 | True position of cavity with rear OD | VL-IV | 3.2 | Gage |
| 108 | Protective finish missing or inadequate | VL-IV | 3.2 | Visual |
| 109 | True position of forward OD with rear OD | VL-IV | 3.2 | Gage |
| 110 | Radius at bottom of cavity over maximum | VL-IV | 3.2 | Gage |
| 111 | Salt spray test | 25 | 3.2.1 | Visual/4.5.9 |
| <u>Minor</u> | | | | |
| 201 | Radii or chamfers missing or improper | VL-III | 3.2 | Visual |
| 202 | Surface finish improper | VL-III | 3.2 | Visual |
| 203 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.8 | TITLE Tube, Flash | SHEET 1 OF 1 | | DRAWING NUMBER 9294758 |
|----------------------|--|----------------------|-----------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294757 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | | | | |
| A | Longitudinal flash hole missing or obstructed | 100% | 3.2 | Visual |
| B | Flash hole(s) missing or excessive in number or obstructed | 100% | 3.2 | Visual |
| <u>Major</u> | | | | |
| 101 | True position of flash holes to forward outside diameter and rear face | VL-IV | 3.2 | Gage |
| 102 | Diameter of flash holes | VL-IV | 3.2 | Gage |
| 103 | Overall length | VL-IV | 3.2 | Gage |
| 104 | Large outside diameter | VL-IV | 3.2 | Gage |
| 105 | Small outside diameter | VL-IV | 3.2 | Gage |
| 106 | Length of small outside diameter | VL-IV | 3.2 | Gage |
| 107 | Large inside diameter | VL-IV | 3.2 | Gage |
| 108 | Length of large inside diameter | VL-IV | 3.2 | Gage |
| 109 | Protective finish missing or inadequate | VL-IV | 3.2 | Visual |
| 110 | Small inside diameter | VL-IV | 3.2 | Gage |
| 111 | Salt spray test | 25 | 3.2.1 | Visual/4.5.9 |
| <u>Minor</u> | | | | |
| 201 | Surface finish improper | VL-III | 3.2 | Visual |
| 202 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.9 | TITLE Flash Tube Assembly | SHEET 1 OF 1 | | DRAWING NUMBER 9294757 |
|-------------------------|---|-------------------------|--------------------------|---------------------------------|
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> A | Heat shrinkable tubing missing, loose, or does not completely cover all flash holes | 100% | 3.2 | Visual/Manual |
| <u>Major</u> 101 | Pin missing | 100% | 3.2 | Visual |
| 102 | Length, max. | VL-IV | 3.2 | Gage |
| <u>Minor</u> 201 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| | | | | |
|-----------------------|---|-------------------------|--------------------------|---------------------------------|
| PARAGRAPH 4.4.2.10 | TITLE Tube Assembly | SHEET 1 OF 1 | | DRAWING NUMBER 9294753 |
| | | | | NEXT HIGHER ASSEMBLY 9294752 |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | None defined | | | |
| <u>Major</u> 101 | Outside diameter, max. | VL-IV | 3.2 | Gage |
| 102 | Tubing missing, loose, wrinkled, separating or inadequately covering external surface | VL-IV | 3.2 | Visual/Manual |
| <u>Minor</u> 201 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| PARAGRAPH 4.4.2.11 | TITLE Body Assembly | SHEET 1 OF 1 | | DRAWING NUMBER 12630551 |
|--|---|-------------------------|--------------------------|-----------------------------|
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | None defined | | | |
| <u>Major</u> | | | | |
| 101 | Primer missing or inverted | 100% | 3.2 | Visual |
| 102 | Primer above flush or more than .015 in. below flush | VL-IV | 3.2 | Gage |
| 103 | Lacquer seal missing or inadequate | 100% | 3.2 | Visual/4.5.3.1 |
| 104 | Presence of any adhesive or sealant on face of primer | VL-IV | 3.2 | Visual |
| 105 | Staking process inadequate | 1/ | 3.2 | Gage/4.4.3.5 |
| 106 | Primer bulged after staking | 100% | 3.2 | Visual |
| 107 | One or more stakes missing or not full | 2/ | 3.2 | Visual |
| <u>Minor</u> | | | | |
| 201 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: 1/ See 4.4.3.5 2/ Inspect the tool or one body at the start of each day's production and each hour thereafter. A missing or broken tooth shall be cause for rejection of all parts staked since the last successful inspection. | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| | | | | |
|---|---|---|---|--|
| PARAGRAPH 4.4.2.12 | TITLE Cartridge, Ignition Prior to Filling with Propellant | SHEET 1 OF 1 | | DRAWING NUMBER 9294752 |
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> 1 2 | Sensitivity non-functioning Safety drop test | <u>1</u> / 25 <u>2</u> / | 3.4.1 3.4.3 | 4.5.2.1 4.5.2.3 |
| <u>Critical II</u> A | Firing plug above flush with head surface | 100% | 3.2 | Visual/Manual |
| <u>Major</u> 101 102 103 104 105 106 107 108 <u>109</u> <u>Minor</u> 201 | Body not fully assembled to head Body and head improperly staked (2 places) Pellet missing or broken Presence of adhesive for 360 degrees in body groove prior to assembling to tube assembly Tube assembly improperly seated on body Sensitivity functioning Flash tube assembly missing O-ring missing or not fully seated on the firing plug Firing plug not seated properly (cocked) Evidence of poor workmanship | VL-IV VL-IV 100% <u>3</u> / VL-IV VL-IV <u>4</u> / 100% 100% 100% VL-III | 3.2 3.2 3.2 3.2 3.2 3.4.2 3.2 3.2 3.2 3.12 | Visual Visual Visual Visual Visual Visual Visual Visual/Manual Visual/Manual Visual |
| NOTES: <u>1</u> / See sampling plans contained in paragraph 4.4.3.3.1. <u>2</u> / See sampling plans in paragraph 4.4.3.3.3. <u>3</u> / Minor chipping of edges acceptable, no chunks or excessive chipping. <u>4</u> / See sampling plans contained in paragraph 4.4.3.3.2. | | | | |

**CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS**

| PARAGRAPH 4.4.2.13 | TITLE Cartridge, Ignition, Prior to Assembly of Cap | SHEET 1 OF 1 | | DRAWING NUMBER 9294752 |
|---|---|-------------------------|--------------------------|-----------------------------|
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> 1 | Flash tube assembly missing | 100% | 3.2 | Gage |
| <u>Critical II</u> A | Propellant weight greater than 10 grains below lower limit or above upper limit (after loading) | 100% <u>1/</u> | 3.2 | 4.4.3.1/4.5.4.1/Gage |
| <u>Major</u> 101 | Propellant weight (after loading) | 100% <u>1/</u> | 3.2 | 4.4.3.1/4.5.4.1/Gage |
| 102 | Environmental conditions inadequate | <u>2/</u> | 3.2 | Gage |
| <u>Minor</u> 201 | Foreign matter in charge | VL-III | 3.2 | Visual |
| 202 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: <u>1/</u> Same sample used for both inspections. See 4.4.3.2 for defect description. <u>2/</u> Temperature and humidity shall be checked at the beginning and end of each shift. If conditions are not proper at either time, the quantity of product represented by the conditioning shall be rejected. | | | | |

CONFORMANCE INSPECTION
CLASSIFICATION OF CHARACTERISTICS

| | | | | |
|--|---|----------------------|-----------------------|-----------------------------|
| PARAGRAPH 4.4.2.14 | TITLE Cartridge, Ignition, After Assembly of Cap | SHEET 1 OF 1 | | DRAWING NUMBER 9294752 |
| | | | | NEXT HIGHER ASSEMBLY |
| CLASSIFICATION | EXAMINATION OR TEST | CONFORMANCE CRITERIA | REQUIREMENT PARAGRAPH | INSPECTION METHOD REFERENCE |
| <u>Critical I</u> | None defined | | | |
| <u>Critical II</u> | | | | |
| A | Propellant weight greater than 10 grains below lower limit or above upper limit | 315 1/ | 3.2 | 4.4.3.2/4.5.4.2 |
| B | Static pressure test | 25 2/ | 3.8 | Gage/4.4.3.6/4.5.7 |
| <u>Major</u> | | | | |
| 101 | Channel not completely filled with RTV sealant | VL-IV | 3.2 | Visual |
| 102 | Cap cocked or not completely seated | VL-IV | 3.2 | Visual |
| 103 | Distance from shoulder to front of cap, max | VL-IV | 3.2 | Gage |
| 104 | True position of outside diameter with major diameter of head thread | VL-IV | 3.2 | Gage |
| 105 | Propellant weight | 315 1/ | 3.2 | 4.4.3.2/4.5.4.2/Gage |
| 106 | Leak test | 100% | 3.5 | 4.5.4.2 |
| 107 | Velocity, functioning and security (proving ground) | 3/ | 3.6 | 4.5.5 |
| 108 | Environmental conditions inadequate | 4/ | 3.2 | Gage |
| 109 | Presence of excessive sealant | VL-IV | 3.2 | Visual |
| <u>Minor</u> | | | | |
| 201 | Marking missing, misleading or unidentifiable | VL-III | 3.2 | Visual |
| 202 | Evidence of poor workmanship | VL-III | 3.12 | Visual |
| NOTES: 1/ This inspection shall be conducted just prior to pack out. See sample used for both inspections (see 4.4.3.2 for defect description). 2/ See paragraph 4.4.3.6 for sampling plans.. 3/ See paragraph 4.4.3.4 for sampling plans. 4/ Temperature and humidity shall be checked at the beginning and end of each shift. If conditions are not proper at either time, the quantity of product represented by the conditioning shall be rejected. | | | | |

4.4.3 Testing.

4.4.3.1 Prior to assembly of cap (see Dwg. 9294752). The propellant charge shall be volumetrically dispensed (or tare-weighed) in a container, transferred to the ignition cartridge and then check-weighed 100 percent. The check weighing shall be specified in paragraph 4.5.4.1. The volumetric dispensing (or initial weighing) and check weighing shall be performed by different operators on different scales. Weight limits for weighing shall be established within the applicable requirements, depending upon the accuracy and precision of the weighing system to assure compliance with the charge weight requirements. Any charge of bulk propellant failing to meet the applicable requirements shall be classed defective and remove from the lot.

4.4.3.2 After assembly of cap (see Dwg. 9294752). Critical defect: More than 10 grains above assessed maximum weight. Critical defect: More than 10 grains below assessed minimum weight. Major defect: 1 to 10 grains above assessed maximum weight. Major defect: 1 to 10 grains below assessed minimum weight. 315 sample ignition cartridge assemblies shall be randomly selected from each lot for this test. If any sample exceeds the assessed maximum weight by more than 10 grains or if two or more samples exceed the assessed maximum weight by 1 to 10 grains, the lot shall be rejected. If any sample is under the assessed minimum weight by more than 10 grains or if two or more samples are under the assessed minimum weight by 1 to 10 grains, the lot shall be rejected. Testing shall be as specified in paragraph 4.5.4.2.

4.4.3.3 Sensitivity

4.4.3.3.1 Nonfunctioning.

a. Beginning with the first lot produced and continuing until three consecutive lots have complied with the acceptance criteria specified, 200 primed head assemblies (consisting of the firing plug Dwg. 13000797, head Dwg. 9293427 and body assembly Dwg. 12630551) shall be randomly selected from each lot for this test. If one or more cartridges fail to comply with the specified requirement, the lot shall be rejected. The test shall be performed as specified in 4.5.2.1.

b. After three consecutive lots have met the criteria of 4.4.3.3.1.a, 125 samples shall be tested using the same acceptance criteria. If a lot is rejected, revert to sampling plan per 4.4.3.3.1.a. The test shall be performed as specified in 4.5.2.1.

4.4.3.3.2 Sensitivity. A random sample of five hundred (500) primed head assemblies (consisting of the firing plug Dwg. 13000797, head Dwg. 9293427 and body assembly Dwg. 12630551) shall be selected from each lot for this test. The test shall be performed as specified in 4.5.2.2 using the Government's design test equipment or an approved alternate (See 4.4.4).

4.4.3.3.3 Safety drop test. Twenty-five ignition cartridge assemblies (without the M9 propellant) in accordance with Dwg. 9294752 shall be selected for first article testing. This test shall be performed only upon initial use of each primer lot. If one or more of the test samples function when tested as specified in 4.5.2.3, lot shall be rejected.

4.4.3.4 Ballistic sampling.

4.4.3.4.1 Ballistic characteristics. The following defect classifications apply to the ballistic testing:

- a. Misfires, Major defect (3.6.1)
- b. Metal part separation, Critical defect (3.6.3)
- c. Mean velocity and standard deviation, Major defect (3.6.2).

4.4.3.4.2 Initial production. Beginning with the first lot produced and continuing until three consecutive lots have complied with the applicable requirements, a sample of 50 ignition cartridges shall be selected and tested as specified in 4.5.5. The lot shall be rejected if:

- a. The mean velocity fails to meet the requirement.
- b. The velocity standard deviation exceeds the requirement.
- c. One or more misfires attributable to the ignition cartridge occur.
- d. One or more metal part separations occur.

4.4.3.4.3 Subsequent production. After three consecutive lots have met the criteria of 4.4.3.4.2, sample of 35 ignition cartridges shall be selected and tested as specified in 4.5.5. If a lot is rejected, revert to sampling plan per 4.4.3.4.2. This test shall be performed as specified in 4.5.5. The lot shall be rejected if:

- a. The mean velocity fails to meet the requirement.
- b. The velocity standard deviation exceeds the requirement.
- c. One or more misfires attributable to the ignition cartridge occur.
- d. One or more metal part separations occur.

4.4.3.5 Staking process (primer security). Each hour, and on the last units staked before a scheduled staking tool change, five (5) primed bodies shall be inspected before and after staking, using any method that can verify that the primer cups have been pushed down as a result of the staking operation. If none of the primer cups have been pushed down, all units loaded since the last successful inspection shall be rejected. If one or more primer cups have been pushed down by any amount, the process may continue unchanged at the discretion of the contractor.

4.4.3.6 Static pressure testing. Twenty-five ignition cartridge assemblies in accordance with Dwg. 9294752 shall be selected for first article testing. This test shall be performed only upon initial use of each propellant lot. The lot shall be rejected if the test results fail to comply with the requirements.

4.4.4 Inspection equipment. The inspection equipment required to perform the inspections specified herein is identified in the "Inspection Method Reference" column of the Classification of Characteristics listings starting with 4.4.2.1. Contractor inspection equipment designs shall be submitted for Government approval as specified in the contract. Designs which provide variable measurements instead of attributes data are preferred in order to facilitate the use of statistical process control. See 6.3 herein.

4.5 Methods of inspection.

4.5.1 Moisture content of black powder. The procedures used for determining the moisture content of the black powder pellets shall be equivalent to that specified in MIL-P-223. A sample of no less than 25 black powder pellets shall be randomly selected from each production shift. If any sample fails to comply with the requirement cited in paragraph 3.3 herein, all pellets in the production shift represented by this sample shall be rejected. If loading with propellant has begun, ignition cartridges loaded with the non-conforming black powder pellets shall be rejected.

4.5.2 Primer testing.

4.5.2.1 Nonfunctioning. The head loading assembly shall be assembled to a suitable fixture. The firing pin of the test fixture shall be adjusted so that impact will be on the center of the firing plug of the assembly. A 2.95 pound steel ball shall be dropped onto the firing pin from a height of 3/16 inch producing 8.85 inch ounces of energy (min.). The height of drop shall be measured as the height from the top of the firing pin to the bottom of the weight. Any head loading assembly that functions shall be classed defective. Samples used in this test shall not be returned to the lot.

4.5.2.2 Sensitivity. The head loading assemblies shall be divided into ten (10) groups of fifty (50) each. When assembled in the Drop Test Fixture (12977160). A 7.8 pound steel weight shall be dropped on to the firing pin starting from a height of **0.15** inches. The height of the drop shall be increased by **0.5** inches after each group of fifty primers is tested until the all fire height is reached. The "fire" and "no fire" events shall be recorded for each group. The mean drop velocity and standard deviation shall be calculated and recorded (see 6.8). And should the mean and standard deviation not meet the requirements of paragraph 3.4.2 or if an all fire height is not reached after all 500 primer housing assemblies have been tested, the lot shall be rejected.

4.5.2.3 Safety drop test. The test assemblies shall be assembled into inert-loaded, standard 81mm cartridges (Weighed to 10.35 ± 0.02 lbs. for M819). Each cartridge shall be dropped twice from a height of 1.5m on an anvil top surface. For the first drop, the cartridge shall be in the base (fin) down orientation. For the second drop, the cartridge shall be in the nose

(fuze) down orientation. The drop height shall be measured from the lowest point of the cartridge orientation to the top of the anvil surface. Any test assembly which functions as a result of the drop shall be classed defective. All questionable test assemblies shall be downloaded to verify primer functioning or nonfunctioning. This test shall be performed only upon initial use of each primer lot. All components used for this test shall not be returned to their respective lots.

4.5.3 Leak tests.

4.5.3.1 Body assembly. After the lacquer has cured, each primed body assembly shall be tested for leakage around the primer. The pressure differential and duration of the test shall be as specified for the leak test of the fully assembled ignition cartridge (see 4.5.3.2). Any body assembly which fails the test shall be classed defective and removed from the lot.

4.5.3.2 Ignition cartridge. The ignition cartridges shall be subjected to a pressure of 3 ± 1 psi for duration of five (5) seconds minimum. Any ignition cartridge with a leak rate of 1.5 CC per minute or greater shall be rejected and remove from the lot. The test equipment shall be calibrated at the start of each day's operation and prior to production restarts. A restart results from any break in continuous production whether it is due to equipment stoppage/failure or operator breaks. Both accept and reject standards shall be used for each calibrated occasion. If the equipment is out of calibration, the ignition cartridges tested since the last successful calibration shall be retested after correction of the equipment. Equipment design shall be submitted for approval (see 4.4.4).

4.5.4 Weight of propellant.

4.5.4.1 Prior to assembly of cap. The ignition cartridge subassembly shall be weighed before and after the propellant is loaded. The weight of the propellant charge shall be determined by subtracting the tare weight of the ignition cartridge subassembly from the gross weight (after loading). The contractor may elect to perform the 100 percent check-weighing operation with automated equipment and mandatory process controls. In such cases, process control plans in accordance with data item description DI-P1604 must be submitted to the technical agency for approval of the automated operations.

4.5.4.2 After assembly of cap. The propellant shall be removed from each ignition cartridge sample, placed on the pan of a precision or analytic balance and weighed. Alternatively, the ignition cartridge assembly may be weighed and reweighed after removal of the propellant: The weight of the propellant charge shall be determined by subtracting the weight of the empty ignition cartridge from the loaded (gross) weight. The weight of the propellant in each sample shall be determined to the nearest 0.01 grain.

4.5.5 Velocity, functioning and security (proving ground test). The test shall be performed at a Government Proving Ground in accordance with the applicable USA TECOM Acceptance Test Procedure.

The sample ignition cartridges shall be assembled to 81mm cartridges for which they were manufactured (total weight as referenced in Table I). The complete assembly, less propelling charges, shall be fired from an M252 81mm mortar at an elevation of forty-five degrees.

Reference rounds shall be fired without propelling charges for the purpose of velocity correction. At least one calibration round should be fired for every three test rounds.

Individual velocities and individual chamber pressure shall be recorded on the firing record for both calibration and test rounds. Velocity and pressure standard deviations and arithmetic averages shall be calculated and recorded. Temperature of the day and time of firing shall also be recorded. In the event of a misfire, the misfired ignition cartridge shall not be disassembled by the proving ground but shall be forwarded to the responsible technical activity. Individual chamber pressure shall be obtained for each round firing.

4.5.5.1 Refiring. If for any reason the proving ground considers that conditions have detrimentally affected the test results, additional cartridges as required shall be tested.

4.5.6 Propellant charge uniformity. (To be conducted at a U.S. Government Proving Ground). Ten test ignition cartridges shall be loaded at charge weight with a tolerance of plus or minus 0.5 grains. The ignition cartridges shall be assembled to 81mm production rounds. Rounds shall be inert loaded to achieve a total weight as specified in Table I. The rounds shall be conditioned at 70°F ($\pm 2.5^\circ\text{F}$) for 24 hours prior to firing and shall be maintained at this temperature until fired. The rounds shall be fired from a M252 81mm mortar at an elevation of forty-five degrees. Reference rounds shall be fired alternately for velocity correction.

The corrected velocities of the group shall be compared to the established charge velocity. If the corrected velocity of the test rounds exceeds \pm two percent of the expected muzzle velocity, use of the propellant lot shall be referred. Test results shall be forwarded to the technical agency for evaluation (see 6.5).

4.5.7 Static pressure test. The static pressure test will be performed with equipment/fixtures in general conformance to the concept on Figure 1. The ignition cartridges shall be threaded into the M28/M29 Fin and firmly seated. A 1/8-inch hole shall be drilled in the ignition cartridge tube through one flash hole in the fifth row of flash holes in the fin boom, counting from the ignition cartridge end. A pressure transducer, mounted to a collar (see Figure 2), shall be attached to the fin boom, positioning the collar so that the transducer will be directly over the flash hole drilled in the ignition cartridge tube. The collar shall be positioned carefully to prevent restriction of venting from other flash holes in the boom. The assembly shall be set up as shown in Figure 1 and the transducer connected to a recorder. The ignition cartridge shall then be functioned and maximum pressure and pressure/time trace shall be recorded. Equipment design shall be submitted for approval (see 4.4.4).

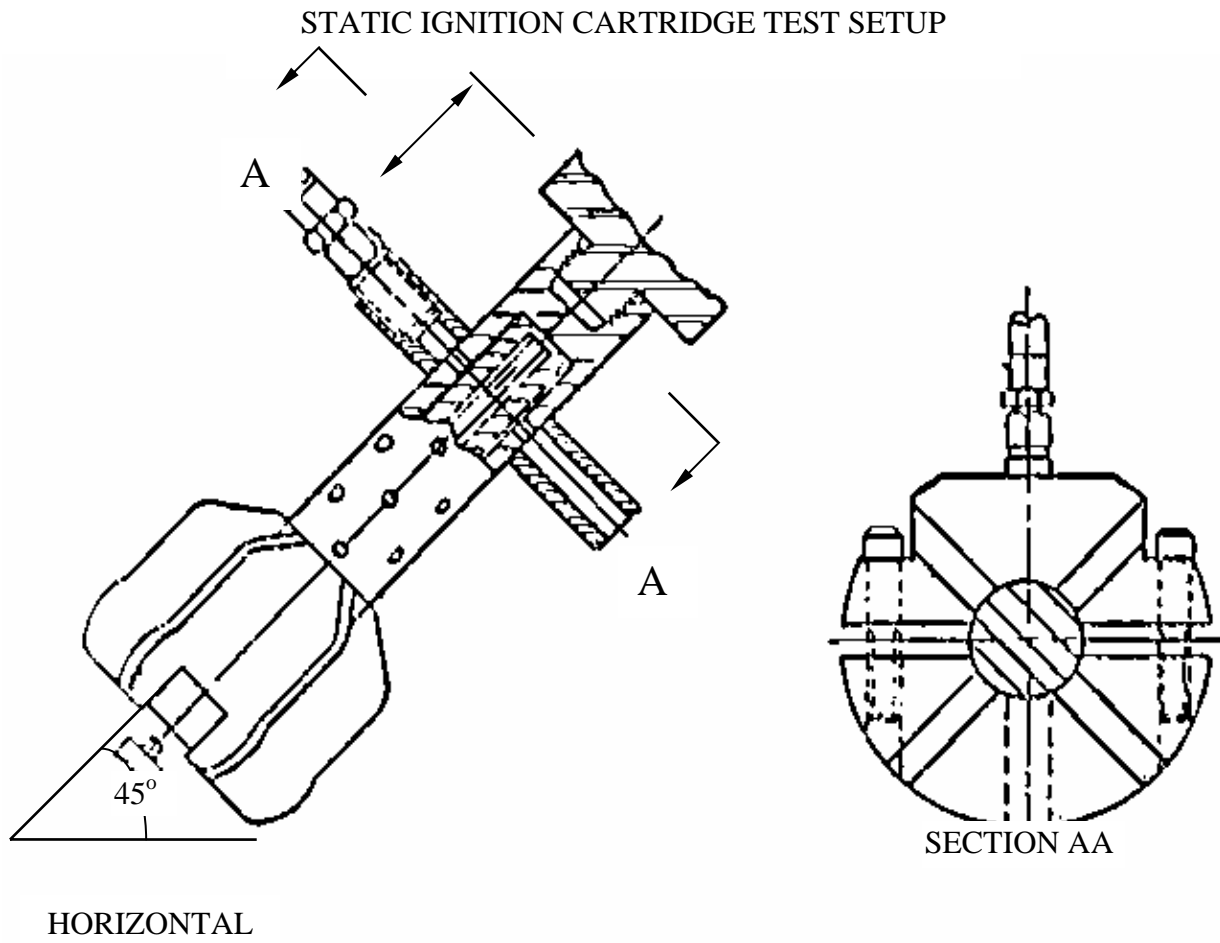


Figure 1

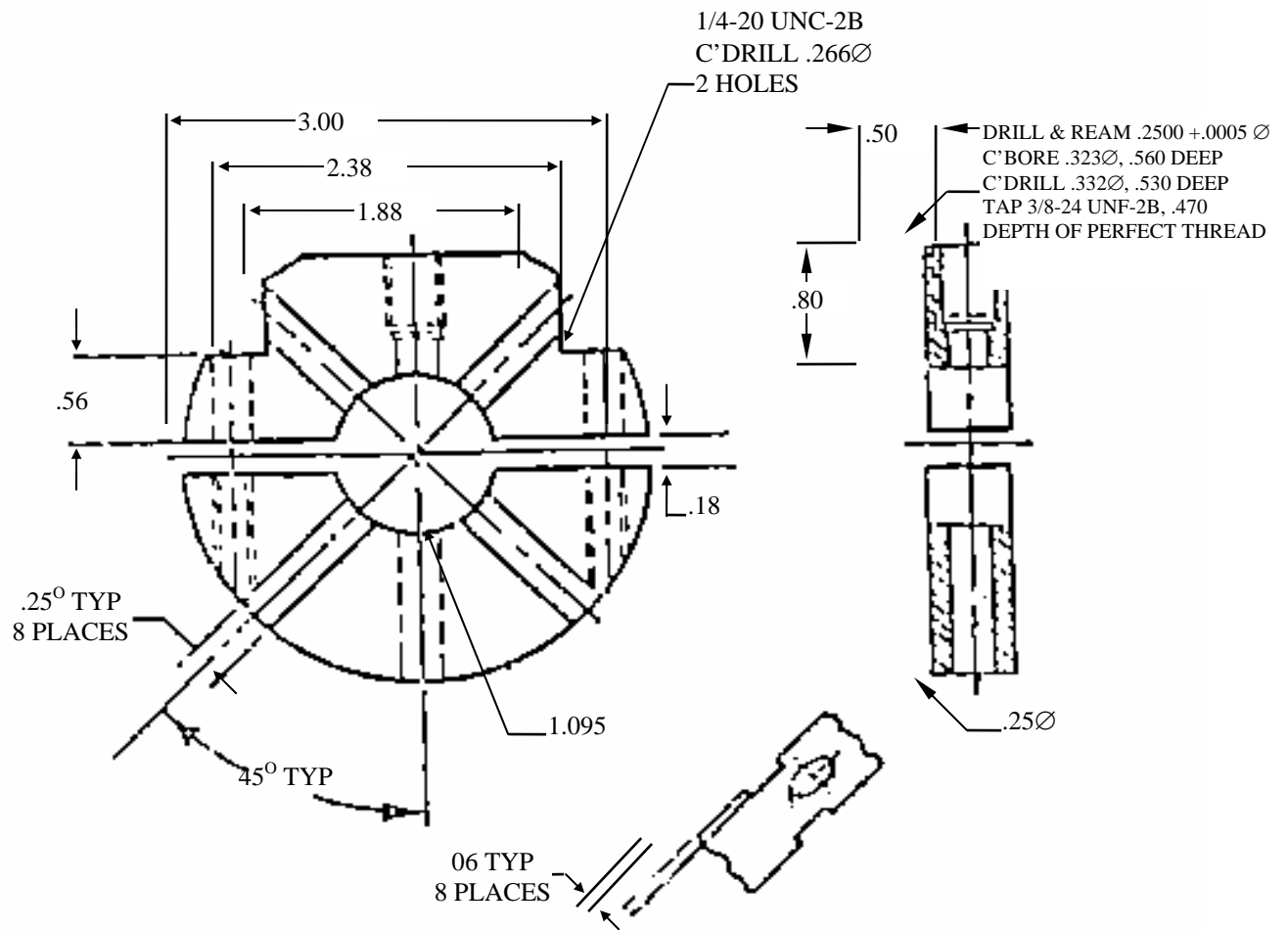


Figure 2

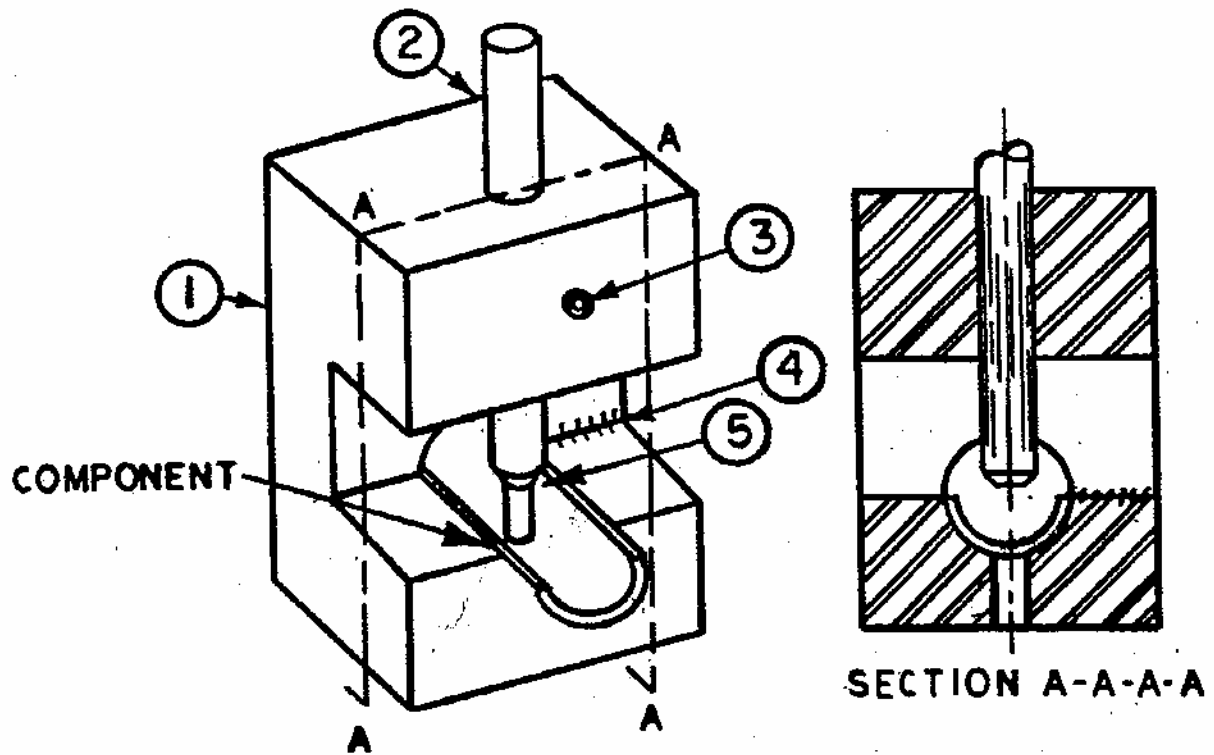
4.5.8 Bursting strength. The tube shall be cut in half lengthwise and one of the halves placed in the fixture (see Figure 1). The stop (3) shall be completely removed or backed off so that it does not touch the punch (2). Place fixture in universal tester set for a travel speed of 0.125 inches per minute. Proceed with Test Number 1 and 2.

TEST NUMBER 1: NO BURST

Apply 57-pound compression load, remove body assembly. Item is rejected if evidence of bursting is observed. Tearing or puncturing of material shall be considered evidence of bursting.

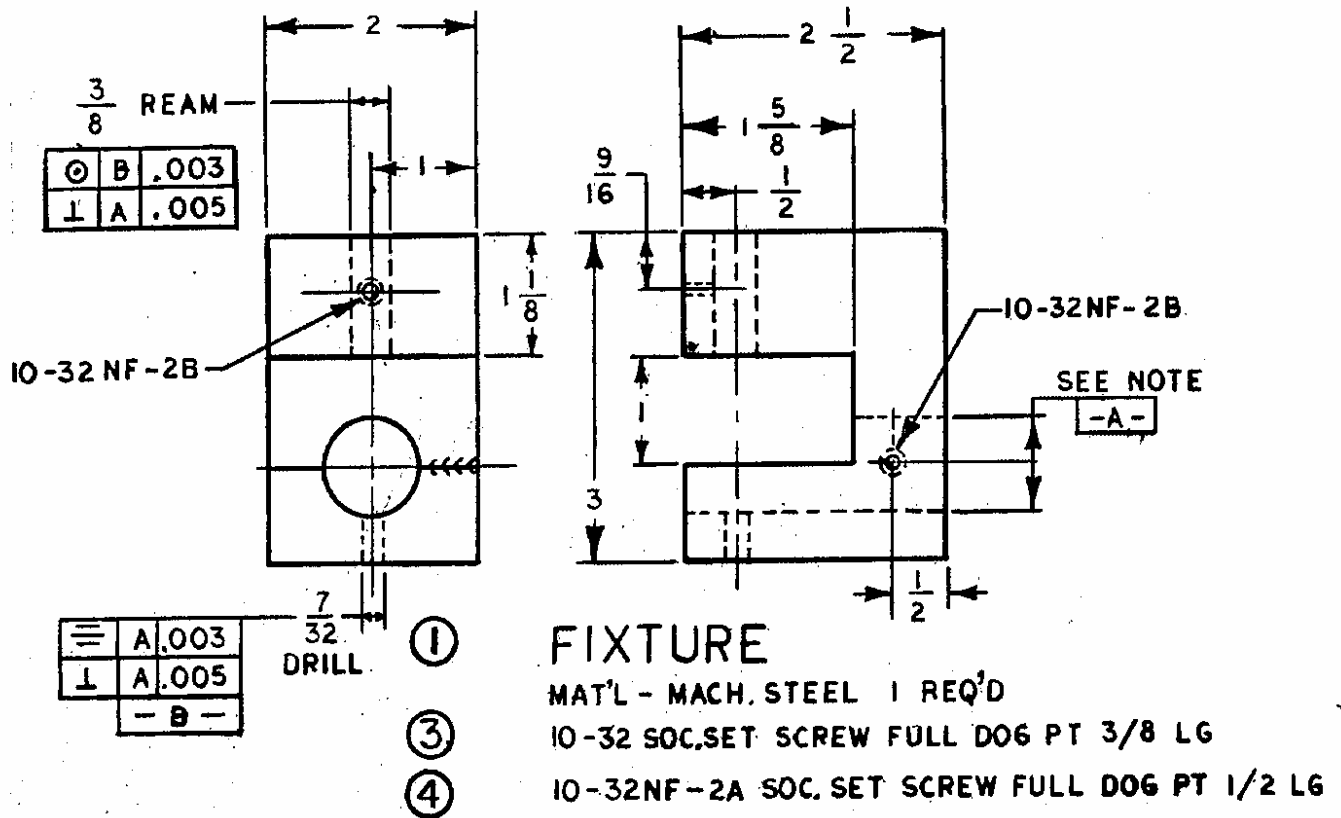
TEST NUMBER 2: BURSTING

If item is not rejected, replace it in fixture, using opposite end of body and apply 192 pounds compression load. If item shows no evidence of bursting (punch travels through material) it shall be rejected.



ASSEMBLY BUSTING STRENGTH TEST FIXTURE

Figure 1 – Sheet 1



NOTE DIAMETER TO SUIT APPLICABLE BODY ASS'Y

DIMENSIONS ARE IN INCHES
 TOLERANCES ON DECIMALS $\pm .005$
 FRACTIONS: 1/64
 ANGLE $\pm 2^\circ$

Figure 1 - Sheet 2

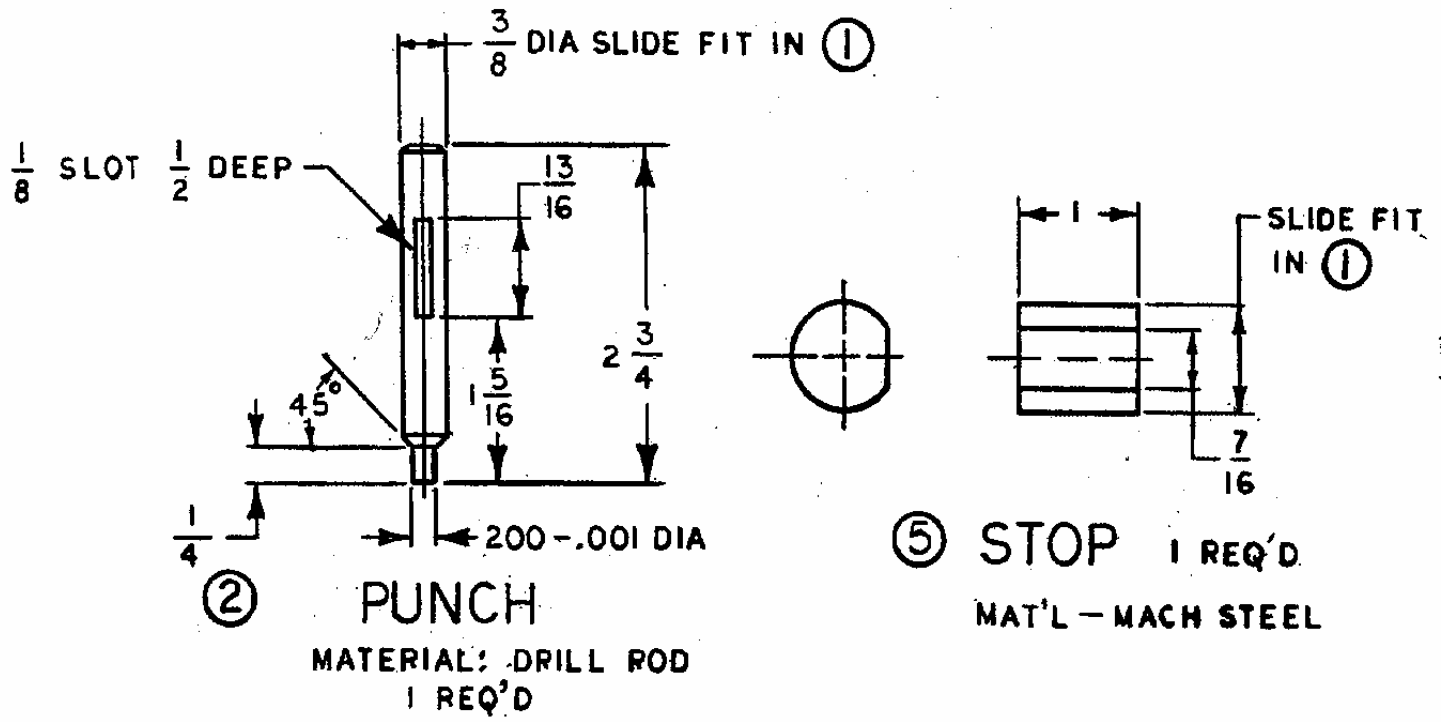


Figure 1 - Sheet 3

4.5.9 Salt spray testing. Samples selected for this test shall be tested using equipment and procedures in accordance with ASTM B117. Test duration shall be specified on the drawing. Parts shall be rinsed, dried and examined for evidence of pitting or mottling of the finish. One or more pits or mottling shall be cause for rejection of all parts represented by the sample.

4.5.10 Check test for deterioration of ignition cartridge. The following test is designed to prevent the loading of major ammunition items with ignition cartridges which have deteriorated. The test shall be performed on each lot of ignition cartridges which have been stored under normal conditions for more than two years or under adverse conditions for any period of time. If the specification for the ammunition item into which the ignition cartridge is assembled does not require that the check test be performed, the contracting officer shall insert a provision for the performance of the check test in the contract. The contracting officer shall arrange to have the contractor be reimbursed for any expense incurred in the performance of the check test for possible deterioration.

4.5.10.1 Velocity, functioning and security. A sample of 50/35 ignition cartridges shall be selected for this test. If the mean velocity or velocity standard deviation exceeds the requirements, the lot shall be rejected. If any round fails to function for reasons attributable to ignition cartridge failure, or if a metal parts separation occurs, the lot shall be referred. This test shall be performed as specified in 4.5.5.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DOD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's system Command. Packaging data retrieval is available from the managing Military Departments or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of general or explanatory nature and may be helpful, but not mandatory.)

6.1 Intended use. The components covered by this product description are intended for assembly to M819, M853A1, and M816 cartridges for use with the 81mm Mortar system.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number and date of this specification.

- b. Issues of DODISS to be cited in the solicitation and if required, the specific issue of the individual documents referenced (see 2.1).
- c. Provisions for submission of first article sample.
- d. Test support hardware (see 6.11).
- e. Requirements for Ammunition Lot Number (see 4.4.1)
- f. Requirements for acceptance inspection equipment (AIE) designs (see 6.3).
- g. Certificate of Conformance requirement for each lot of material and each lot or shipment of product.
- h. Requirements for First Article (see 4.3)

6.3 Submission of contractor inspection equipment designs for approval. Submit copies of designs as required to:

Commander, US Army RDECOM-ARDEC
ATTN: AMSRD-AAR-QEM-C
Building 62, Picatinny Arsenal, NJ 07806-5000

This address will be specified on the Contract Data Requirements List, DD form 1423 in the contract.

6.4 Drawings. Drawings listed in Section 2 of this specification under the heading U.S. Army Armament, Research Development and Engineering Center (ARDEC) may also include drawings prepared by, and identified as ARRADCOM, Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under the cognizance of ARDEC.

6.5 Submission of test data. One copy of proving ground ballistic acceptance test data (i.e., firing record) shall be forwarded to each of the following:

Commander, U.S. Army RDECOM-ARDEC
ATTN: AMSRD-AAR-QEM-C
AMSRD-AAR-AEM-M
Picatinny Arsenal, NJ 07806-5000

6.6 Submission of alternative conformance provisions. All contractor proposed alternative conformance provisions will be submitted to the Government for evaluation/approval as directed by the contracting activity.

6.7 Sensitivity calculations. The mean drop velocity and standard deviation shall be calculated using an ARDEC developed software program. For a copy of the software contact

Commander, U.S. Army RDECOM-ARDEC
ATTN: AMSRD-AAR-QEM-C
Building 62 South, Picatinny Arsenal, NJ 07806-5000

6.8 Burst strength test fixture. Equipment designs for similar paper tubes are available for reference in MIL-C-48161, MIL-C-48155 and MIL-C-48396. For copies contact,

Commander, U.S. Army RDECOM-ARDEC
ATTN: AMSRD-AAR-QEM-C
Picatinny Arsenal, NJ 07806-5000

6.9 Definitions. The following definitions are provided:

6.9.1 Verification methods:

- a. Analysis - The use of analytical methods and mathematical formulas to determine if an item meets a requirement
- b. Demonstration - A functional test (for example, ballistic firing) that provides verification that a requirement is met
- c. Examination - Inspections utilizing gage(s) or visual means to assure conformance to requirement
- d. Test - The conduct of specific procedures and methods to provide data verifying a requirement is met

6.10 Critical Classification Rationale:

| Paragraph | Critical Callout(s) | Critical Rationale |
|-----------|--|--|
| 4.4.2.6 | C II – A Flash hole missing or obstructed | Defect may create elevated pressure inside fin cavity causing rupturing of the fin. Defect may also prevent propulsion gases to evenly ignite surrounding propelling charges. May lead to short round. |
| 4.4.2.8 | C II – A Longitudinal flash hole missing or obstructed | Defect may create elevated pressure inside fin cavity causing rupturing of the fin. Defect may also prevent propulsion gases to evenly ignite surrounding propelling charges. May lead to short round. |
| 4.4.2.8 | C II – B Flash hole(s) missing or excessive in number or obstructed | Defect may create elevated pressure inside fin cavity causing rupturing of the fin. Defect may also prevent propulsion gases to evenly ignite surrounding propelling charges. May lead to short round. |

| | | |
|----------|--|---|
| 4.4.2.9 | C II – A Heat Shrinkable tubing missing, loose, or does not completely cover the flash holes | Erratic/uneven ignition of M9 Flake will lead to improper burning of propelling charge, which could cause potential short round. |
| 4.4.2.12 | C I -1 Sensitivity non-functioning | This test is conducted to ensure that the primer is not too sensitive. A defect may lead primer initiation during cartridge handling likely resulting in death or serious injury to the soldier. |
| 4.4.2.12 | C I -2 Safety Drop Test | To ensure the safety requirements are met. If a round is dropped the propellant shall not be initiated. If it is, a serious injury to the user may result. |
| 4.4.2.12 | C II -A Firing plug above flush with head surface | If a round is dropped the Ignition Cartridge/Propellant may be initiated. If it is serious injury to the user may result. |
| 4.4.2.13 | C I -1 Flash tube assembly missing | To ensure that the ignition train is properly executed to ignite the propellant charges. A defect may lead to a misfire. |
| 4.4.2.13 | C II -A Propellant weight greater than 10 grains below lower limit or above upper limit (after loading) | This is classified as critical because the low amount of propellant could produce a short round. High amount of propellant could produce high pressure build up in the tube resulting in possible rupture of gun barrel expelling shrapnel and blast effects to the gun area/location causing a serious injury to the user. |
| 4.4.2.14 | C II -A Propellant weight greater than 10 grains below lower limit or above upper limit | This is classified as critical because the low amount of propellant could produce a short round. High amount of propellant could produce high pressure build up in the tube resulting in possible rupture of gun barrel expelling shrapnel and blast effects to the gun area/location |
| 4.4.2.14 | C II – B Static Pressure Test | To ensure the safety requirements are met. If the pressure created by the propellant is too high, it could possibly result in high pressure rupture of gun barrel expelling shrapnel and blast effects to the gun area/location causing a serious injury to the user. |

6.11 Test support hardware. The following test hardware quantity is required to conduct the safety drop test and ballistic test for each of the First Article and Lot Acceptance Testing.

| <u>Hardware</u> | <u>Safety Drop</u> | <u>Static Pressure</u> | <u>Ballistic</u> |
|---|--------------------|------------------------|------------------|
| Inert M772 fuze | 25 | - | 50 |
| Inert loaded M816/M819/M853A1 body assembly | 12 | - | 50 |
| M28/M29 fin | 25 | 25 | 50 |

6.12 Ammunition lot numbers and data cards. Ammunition lot numbers and Ammunition Data Cards shall be in accordance with MIL-STD-1168.

6.13 Subject term (key word) listing.

Functioning test
Leak test
Sensitivity
Velocity